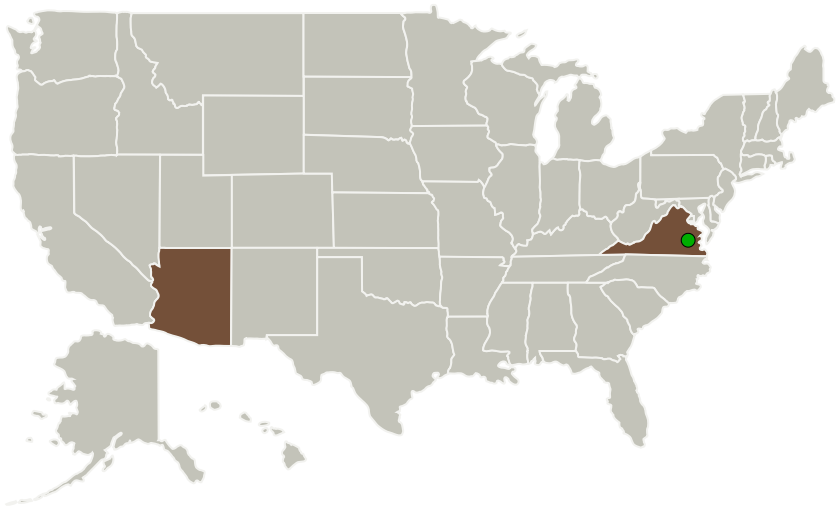
Tunable Narrow Linewidth, Low Noise 2.05 Micron Single Frequency Seeder Laser, Phase II

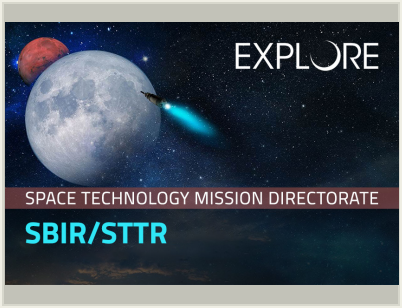
Completed Technology Project (2011 - 2013)

Project Introduction

We propose an all-fiber based 2.05-micron single frequency, narrow linewidth seeder laser with 10 nm tuning range and 5GHz frequency modulation for next generation LIDAR system. Highly Tm-doped fiber laser is used as a resonant pump source in order to reduce the phase noise and laser linewidth. An environment insensitive package will be used to minimize the laser phase noise and linewidth. Ho3+-doped fiber is used for seed laser generation, due to its strong emission at 2.05 micron. A Piezo attached to the laser cavity is used to modulate the frequency to 5 GHz with speed up to 10KHz. The laser can be continuously tuned over 10 nm range. The single frequency 2.05-micron fiber laser can be used to build coherent laser radars and Differential Absorption Lidars (DIALs) to perform instant measurement of velocity and concentration of CO2 and other gases , aerosols, clouds. The high-speed frequency modulation (5 GHz) of single frequency fiber laser used as local oscillator covers tuning over a selected CO2 absorption line. The large wavelength tuning range (10 nm) also enable scientists and engineers to explore the feasibility of using such laser for other remote sensing applications.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
NP Photonics, Inc.	Lead Organization	Industry	Tucson, Arizona
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Arizona	Virginia

Project Transitions

June 2011: Project Start

May 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139986)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

NP Photonics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

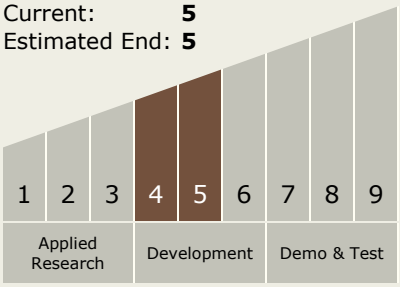
Carlos Torrez

Principal Investigator:

Jianfeng Wu

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System